The Periodic Table

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
H 1 1.01																	He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31											Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263)	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)			

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11

Average Single Bond Lengths (Picometers)

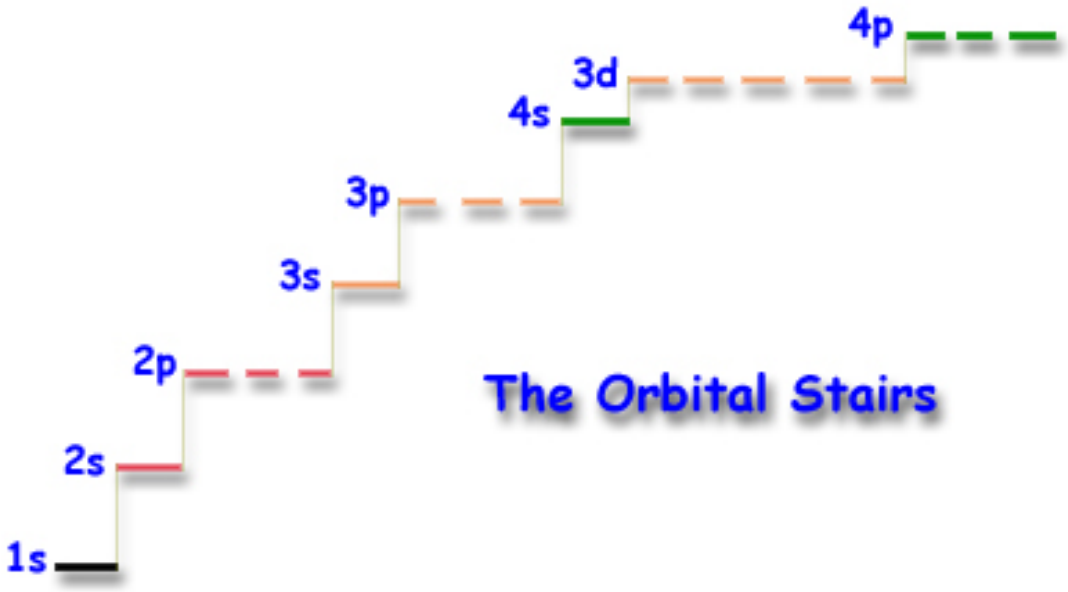
	H	C	N	O	F	Si	P	S	Cl	Br	I
H	74	110	98	94	92	145	138	132	127	142	161
C		154	147	143	141	194	187	181	176	191	210
N			140	136	134	187	180	174	169	184	203
O				132	130	183	176	170	165	180	199
F					128	181	174	168	163	178	197
Si						234	227	221	216	231	250
P							220	214	209	224	243
S								208	203	218	237
Cl									200	213	232
Br										228	247
I											266

Average Multiple Bond Lengths (Picometers)

C = C	134	C ≡ C	121
C = N	127	C ≡ N	115
C = O	122	C ≡ O	113
N = O	115	N ≡ O	108

1 pm = 1×10^{-12} m

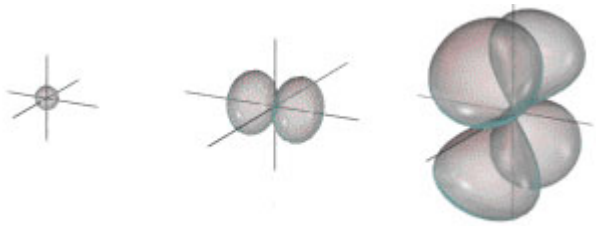
1s							
2s	2p						
3s	3p	3d					
4s	4p	4d	4f				
5s	5p	5d	5f				
6s	6p	6d					
7s	7p						



SID | | | | | | | | | Last _____ First _____

Question 1 (4 Points)

Each of the orbitals depicted has the **lowest** value of **n** possible **for its type**. Which one has the **highest n** value?



a b c

Question 2 (6 Points)

The orbital depicted on the left is:

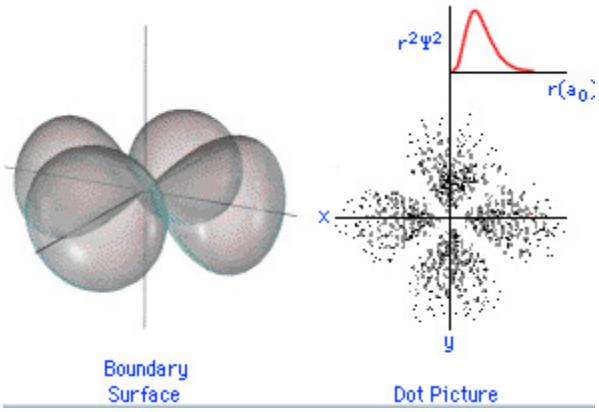
a. What **type** of orbital? _____

b. Its **n** value is? _____

c. Its **specific** designation is?

_____

(xy, xz, yz, x^2-y^2, z^2)



Question 3 (4 Points)

Circle those of the following **orbital designations** are **true** designations?

2s 1d 4p 9d 1p 3f 4g

Question 4 (4 Points)

Give the **complete** electronic configuration for the following:

a. **P** _____ b. **Al^{3+}** _____

Question 5 (6 Points)

Give the **noble gas** configuration for the following

a. **Kr** _____ c. **Cu** _____

b. **Ni^{2+}** _____

Question 6 (6 Points)

Give the **symbol** of the expected **diamagnetic** elements in period **5**? _____

Question 7 (6 Points)

Using only the periodic table **arrange** the following elements in order of **increasing atomic radius**: **sodium, cesium, potassium**

_____ _____ _____

Smallest **Largest**

Question 8
6 Points

Using only the periodic table **arrange** the following elements in order of **decreasing ionization energy**: **bromine, potassium, gallium**

_____ _____ _____
Largest **Smallest**

Question 9
4 Points

Using only the periodic table **arrange** the following elements in order of **decreasing electron affinity**: **magnesium, silicon, nitrogen, calcium**

_____ _____ _____ _____
Largest **Smallest**

Question 10
8 Points

Draw the **best** Lewis Dot structure for the following

N_2

HFCO

BF_3

XeF_2

Question 11
4 Points

Draw the **best** Lewis Dot structure for **CS_2** on the rough work paper provided and answer the following questions based on your drawing.

With regards to the central atom:

a. The number of **lone pairs** _____
b. The number of **single bonds** _____
c. The number of **double bonds** _____

The central atom:

1) **Obeys** the Octet Rule
2) Has an **incomplete** Octet
3) Has an **expanded** Octet

Question 12
4 Points

Draw the **best** Lewis Dot structure for the following organic molecules

CH_3COCH_3

CH_3CH_2COOH

Question 13
6 Points
(4 Points)

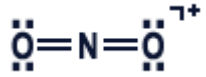
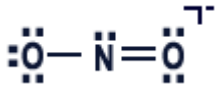
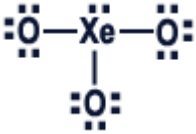
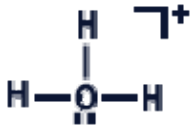
Draw all **reasonable** resonance structure for NO_2^-.

(2 Points)

Circle the best answer:
Average bond length table is on the front page of this exam.
The **N** to **O** bond **length** in **pm** is expected to be:

1. = 136 **2.** > 115 **3.** = 115 **4.** > 136

Question 14
20 Points

A	B	C	D
			
E	**F**	**G**	**H**
			

1. List the **structure(s)** whose **only** bond angle is **180^0** _____

2. Give the **electron pair geometry** (**epg**) for:

   A: _____ C: _____

   B: _____ E: _____

3. Give the **molecular geometry** for:

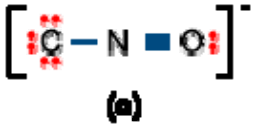
   D: _____ E: _____

   G: _____ H: _____

4. **E**, **F**, **G**, and **H**. The molecule with the **smallest bond angle?** _____

Question 15
6 Points

A resonance structure of **CNO**$^-$ is given below:

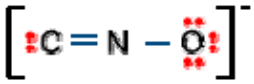

(a)

Give the formal charge on:

C _____ **N** _____ **O** _____

Question 16
6 Points

Another resonance structure of the same molecule is given below



(b)

Do you consider this a **better** structure than that in **Question 15**? _____

Why? _____

_____

_____

Do Not Write Below This

Exam II Score